

Idaho's geographic information coordination and GIS activities have existed since the early 1970s. Statewide coordination is officially directed by the Idaho Geographic Information Advisory Committee (IGIAC) according to an Executive Order signed in 1988. IGIAC was preceded by a State Mapping Advisory Committee (SMAC) authorized by an Executive Order adopted in 1979. As established through a second Executive Order in 1980, and reaffirmed in the Idaho Ground Water Protection Act of 1989, GIS, image processing and remote sensing services are provided by the Idaho Image Analysis Facility (IIAF) in the Department of Water Resources (IDWR). Most GIS applications are for the department's water resources management, however, IIAF's eleven member staff also conduct various projects on contract with state and federal agencies. Other state agencies are also developing GIS capabilities.

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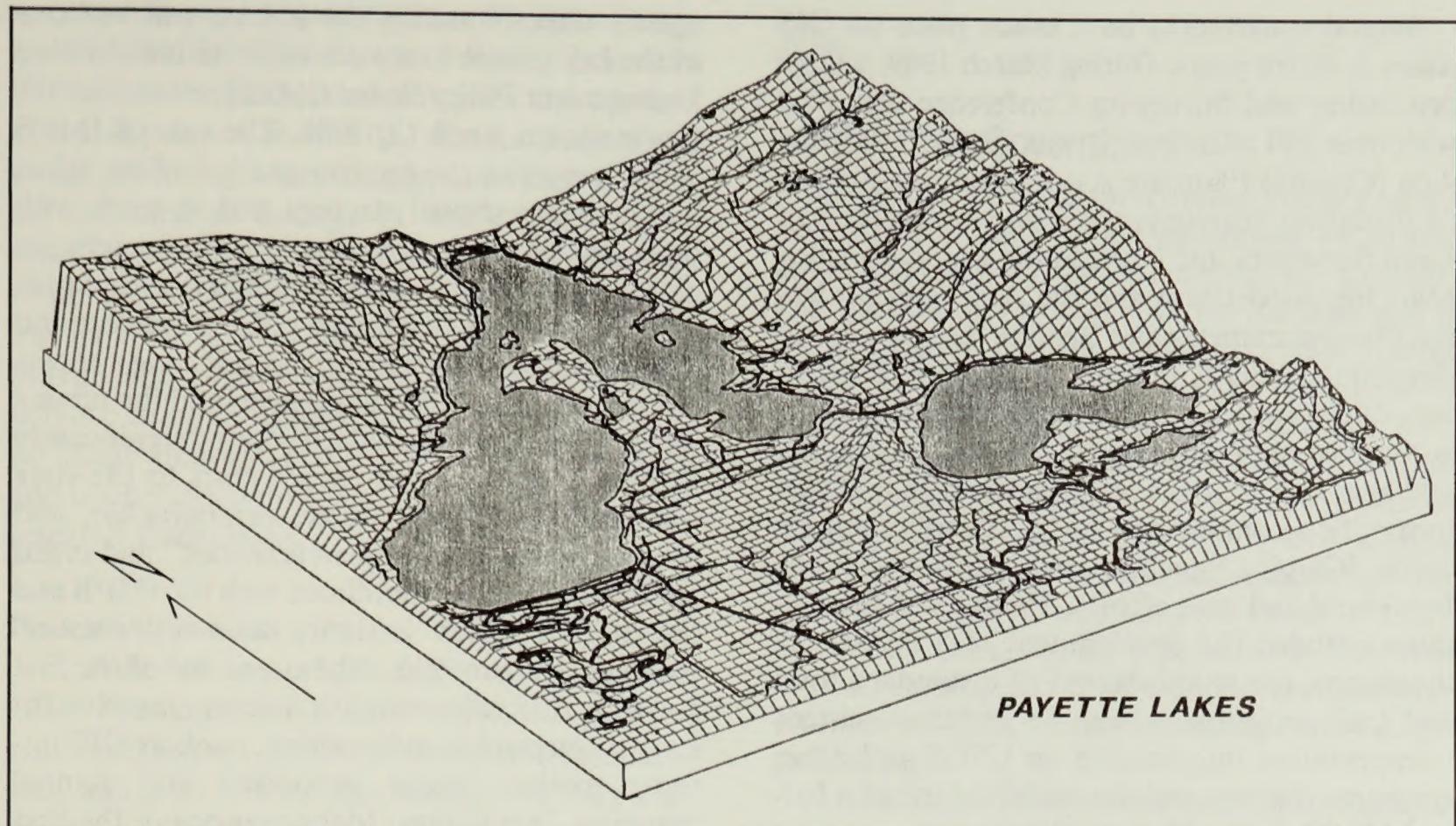
Origins of State Initiatives

Idaho has an early history of GIS and remote sensing use compared to other states. Beginning in 1975, the Idaho Department of Water Resources (IDWR) funded a pilot project at the University of Idaho using satellite imagery for monitoring and analyzing irrigated agriculture. The National Atmospheric and Space Administration (NASA) provided data for the project. Support for the project was subsequently expanded through additional funds as part of the funds allocated to NASA for technology transfer through the Pacific Northwest Regional Commission from 1977 to 1983. NASA also provided image processing software. IDWR used the assistance to map irrigated agricultural areas and habitat. The mapping project resulted in the creation of the Idaho Image Analysis Facility (IIAF) in 1978.

Statewide geographic information and GIS coordination has been directed by the Idaho Geographic Information Advisory Committee (IGIAC) and its predecessor, the Idaho Mapping Advisory Committee (IMAC) since the IMAC was officially established in an Executive Order signed in 1979. The IMAC's initial emphasis was on stan-

dardizing geographic products (aerial photography, orthophotos, and cartographic) and providing input to the U.S. Geological Survey on mapping efforts needed in the state. Since then it has met annually and produced reports of its recommendations.

The Department of Water Resources (IDWR)'s Idaho Image Analysis Facility (IIAF) was officially established by Executive Order in 1980. It was reauthorized in subsequent Executive Order signed in 1984, 1986 and 1988. The 1988 Order reaffirmed IDWR's role as the official lead state agency for the promotion and application of GIS, remote sensing and image processing. The order that stated the IDWR will provide coordination and technical support, promote operational applications of digital image analysis and GIS, provide technical assistance in the form of consultation and training, cooperate with, receive and expend funds from other sources, and assess needed capabilities and cooperate with Idaho universities and other research institutions. The IIAF grew steadily in the 1980s with added personnel and resources. Initially the facility used software developed in-house for image classifica-



tion. It acquired ERDAS image processing software in 1984, and ARC/INFO in 1986. At that time IIAF had six staff working primarily in remote sensing.

In 1984, IDWR organized an informal meeting of state and federal agencies to discuss remote sensing and digital cartography. The purpose of the meeting was for information exchange and to enhance cooperative activities. Subsequently, the group became known as the Remote Sensing and GIS Subcommittee of IMAC. The subcommittee met semi-annually until 1988, but did not have dedicated resources or staff. Recognizing the related needs and common membership of the IMAC and the Remote Sensing and GIS Subcommittee, it was determined that there was no need for a separate group. The IGIAC policy provided for a GIS Subcommittee to help determine statewide data needs, facilitate coordination among agencies, and maintain an inventory of data status, among other coordination roles.

Following these efforts, IMAC's name was changed to Idaho Geographic Information Advisory Committee (IGIAC) by a 1988 Executive Order. The order acknowledged that "various geographic information activities—such as remote sensing, digital cartography, and GIS—are basic to sound resource management," and stated that efforts should be made to "minimize duplication and maximize utilization of state and federal funds expended on these activities," (see **Documents List**).

In 1989, the Idaho *Ground Water Protection Act* passed, creating the Idaho Ground Water Quality Council. The act provided for completion

of the Ground Water Quality Plan, and designated the Department of Health and Welfare as the primary agency to coordinate and administer ground water quality protection programs for the state. It recognized that "the Department of Water Resources has the responsibility to maintain the natural resource GIS for the state and is the collector of baseline data for the state's water resources." The Act directed the Department of Health and Welfare, the Department of Water Resources and the Department of Agriculture to develop and maintain a "comprehensive water resource data system" and a "ground water quality monitoring network," as well as a natural resources GIS. It provided that the systems be made available to the public and directed all state agencies and local governments to "incorporate the adopted ground water quality protection plan in their programs."

Idaho's coordination efforts were assisted during the 1980s with the creation of the U.S. Geological Survey's Resident Cartographer position. The Idaho Department of Lands provided administrative support and space for the Resident Cartographer, and the U.S. Geological Survey (USGS) and the Idaho Transportation Department funded his personnel costs. His role included marketing USGS products and improving coordination between federal and state agencies. This position was vacated in 1989. The Cartographer had an important role in Idaho's coordination activities. The state and USGS have not yet determined how to meet this coordination function.

Several conferences have taken place on GIS issues in recent years. During March 1989, a Geoprocessing and Surveying Conference was held with over 350 attendees. It was sponsored by the Ada (County) Planning Association, the Society of American Foresters, the Idaho Association of Land Surveyors, the Northwest Computer-Aided Mapping Association and the American Society for Photogrammetry and Remote Sensing. A two day annual IGIAC meeting was held in November, during which status reports on manual and automated mapping efforts, aerial photography, and agency activities were presented. In addition to specific recommendations for Idaho's mapping needs, IGIAC adopted general recommendations for federal and state efforts. These recommendations included the development of 1:80,000 orthophotos, the establishment of a standard road and trail depiction process to gather consistent transportation information on USGS and other government maps, and the establishment of a federal USGS field office in Idaho.

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Coordination Efforts, Groups and Activities

Statewide geographic information coordination has been directed by a series of Executive Orders since the 1979 order which officially created the Idaho Mapping Advisory Committee (IMAC). Following these various orders, on June 22, 1988, Governor Andrus signed an Executive Order renaming it the Idaho Geographic Information Advisory Committee (IGIAC). Its scope is comprehensive, including interests of the state, federal resource agencies, local governments and private organizations in the "growing resources management problems in the state." Its areas of interest include manual mapping and various automated geographic information activities including remote sensing, digital cartography, and GIS.

IGIAC's voting members are state agencies, including the Departments of Lands, Transportation, Water Resources, Financial Management, Fish and Game, and Parks and Recreation. After the Executive Order was signed, the State Tax Commission and the Department of Health and Welfare also became members. Ex-officio members include federal agencies operating in the state, industry associations, and key academic institutions in the state with related expertise. The Chief of the Technical Services Bureau at the Department of Lands has served as IGIAC's and previously IMAC's chair since the 1980s.

On the same day that the 1988 Executive Order was signed, the Governor sent a memo to each

agency director stating the IGIAC will be "one of the key groups" to work with the Information Management Policy Board (IMPB), created by the Governor on April 12, 1988. The role of IMPB is to "supervise the implementation of an information management strategy and to work with other groups to approve standards for interchange of electronic data." The Governor indicated his support of IGIAC's adopted policy statement and data standard and its efforts in pursuing cooperation with related federal agencies and the private sector. His memo stated GIS can "significantly increase efficiency and reduce costs to the state for conducting land, water, demographic, and other resource management activities" and urged agency directors to coordinate with the IMPB and the IGIAC when initiating new information management strategies. Idaho was one of the first states to officially establish a comprehensive focus on geographic information, such as GIS, remote sensing, image processing and manual mapping. In addition, Idaho was one of the first states to include interest of a variety of public and private entities, and establish a linkage with other information policy and technology groups and activities.

The IGIAC has an annual meeting each fall to review the status of activities. The most recent meeting was held in November, 1991. The highlights of the meetings were demonstrations that overlaid digital orthophoto data and digital map data; and overlaid digital map data from three separate organizations over the same quad area. These demonstrations took place on-line and were projected on a large screen for the audience. Federal, state and local agencies provided updates on their geographic information activities and needs, including mapping, orthophoto, aerial photography, digital data and GIS implementation. Recommendations were also developed on these issues for federal and state agencies.

The IGIAC, as the IMAC before it, produces an annual report as required by its Executive Order. The 1989 Annual Report includes the policies and standards adopted in 1988, and a report of the state's Geoprocessing Conference held in March and the annual IGIAC meeting in November. The report presents the status of manual mapping, digital data, thematic mapping and aerial ortho photography for Idaho. The state maintains statewide digital data coverages at 1:100,000, for hydrography, transportation and boundaries using Digital Line Graph data from USGS, and also for statewide ownership, public land survey system, and vegetation. Efforts are also underway to establish coverages at the 1:24,000 scale.

According to Executive Order 88-3 (see **Documents List**), the Department of Water Resources (IDWR) is the lead state agency for the application and promotion of GIS, remote sensing and image processing. Accordingly, most such projects are coordinated through IDWR's Idaho Image Analysis Facility (IIAF) which has the majority of the state's GIS technology. In addition to meeting its own agency mission, IIAF is a service bureau and provides technical support and assistance to other agencies in applications of digital image analysis and GIS. It also assesses needs and cooperates with Idaho universities and other research institutions.

Policies/Standards

A *Policy Statement for GIS*, was adopted in 1988. The statement includes objectives, policies, and management and organizational responsibilities, and gives IGIAC responsibility for data standards and the development of specifications for the acquisition of GIS hardware and software by the state purchasing agent and the state data processing coordinator in accordance with each agency's approved automated data processing plan. The statement also established the GIS Subcommittee and its roles and responsibilities, which include determination of statewide data needs and coordination among agencies. This subcommittee has not, however, been officially organized because its limited membership is already included within IGIAC.

Recommended Standards for Digital Cartographic Data were developed by the SMAC on January 29, 1988. They were approved by the Information Management Policy Board and the Information Management Council, and affirmed by the Governor in a June 22, 1988 letter to agency directors. This document covers geographic base data, other state data for use in GIS, and project specific data. Geographic Base Data are statewide data elements and "must be at a level of accuracy suitable for interchange with federal and local entities."

According to the document, the U.S. Geological Survey's Digital Line Graph (DLG) is the recommended standard, and "any data which are digitized from a 7.5 quad map should conform to this DLG standard."

In addition to these general geographic information and GIS coordination directives, the Idaho *Ground Water Protection Act*, adopted in 1989, also authorized GIS coordination (see **Origins of State Initiatives**).

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GIS in State Government

According to the Idaho *Ground Water Protection Act* of 1989, "the **Department of Water Resources** (IDWR) has the responsibility to maintain the natural resource GIS for the state and is the collector of baseline data for the state's water resources." The act directed the Department to work with the Department of Health and Welfare and the Department of Agriculture to develop and maintain a "comprehensive water resource data system" and a "ground water quality monitoring network" as well as a natural resources GIS. According to an Executive Order in 1988, and earlier Orders as far back as 1979, IDWR is the lead state agency for the application and promotion of GIS, remote sensing and image processing.

Accordingly, most state automated geographic information projects are coordinated through IDWR's Idaho Image Analysis Facility (IIAF) located in the Analysis Facility Policy and Planning Division, Technical Services Bureau, Resource Information Section. It helps assess needs of other agencies, and cooperates with Idaho universities and other research institutions. IDWR's GIS facilities are concentrated in the IIAF, but the Policy and Planning Division's Groundwater Protection Section and Planning Bureau are also using their own software and hardware linked to IIAF.

The Department of Water Resources has the majority of the state's GIS technology. It began using ARC/INFO in 1986, and now has nine licenses of it, and two licenses of ERDAS, operating on five 386s, three 286s, and two VAX 3200s. They are linked through Ethernet. Annual expenditures for the IIAF are approximately \$500,000, with half of this funding from state program funds. A third of this funding is from federal funds and fees, and the remaining funding is from the state general fund. The IDWR has nine GIS staff including two remote sensing specialists dedicated to GIS.

The IDWR has several GIS, remote sensing and image processing projects underway that are water resources related, but also is working with various projects in cooperative agreements with other state and federal agencies. Most projects are capturing data layers, building data bases, and analyzing data on a statewide basis. IDWR has a data management role for the state's GIS activities. A "Regional Survey of Energy/Environmental Databases," was conducted by IDWR early in 1990 under contract and with funding from the Bonneville Power Administration.

Applications

Surface water projects include the Snake River Basin Adjudication Project in which GIS, image processing and remote sensing are being used to help adjudicate water rights in the Snake River Basin of Idaho. This area represents almost 90% of the state's land area and the nation's largest water-right adjudication.

The Bear River Compact Depletion Study is being conducted for the Bear River Commission. The Department of Water Resources is using satellite imagery for Idaho, Wyoming, and Utah to develop a historic map for monitoring water development in the Bear River basin. IDWR has combined three types of data into a hybrid image, including Landsat images, a digital version of the Public Land Survey and the Idaho master water rights file. Previously hidden patterns of irrigation over time, irrigation without water rights, water rights not put to beneficial use, and spatial patterns of ground water versus surface are discovered through this method of improving water administration.

The Department of Water Resources is using satellite imagery for Idaho, Wyoming, and Utah to develop a historic map for monitoring water development in the Bear River Basin.

GIS is being used for the Comprehensive Basin Planning project. GIS will help enable the state to conduct licensing of hydro-power rights to be delegated by the Federal Energy Regulatory Commission, Bonneville Power Administration, and the Idaho Public Utilities Commission.

Groundwater projects are also being conducted in addition to surface water efforts. Groundwater vulnerability analyses are being conducted in cooperation with other state and federal agencies. Groundwater source irrigation and an artisan well inventory are being developed by IDWR and analyzed in various locations to determine irrigation's impact on geothermal pools. This GIS work will determine reasons for decline of potentially endangered species and help develop strategies for coexistence of potential endangered species with groundwater use.

IDWR works extensively with federal agencies. Idaho, Montana, Oregon and Washington are working with the U.S. Bonneville Power Administration (BPA) to use GIS in analyzing alternative sites for energy generation. BPA divided its needs for digital data based on each of the four state's

data availability and GIS expertise. BPA funded Idaho to develop digital data coverage at 1:1,000,000 for hydrography and hydro power for the four state region.

IDWR also develops water use statistics for irrigated agriculture and other water information for the USGS Water Resources Division's National Water Use Data Program. IDWR is working with the Department of Energy to develop GIS data for the Idaho National Engineering Laboratory to cooperatively develop data sets for the site.

An initiative being conducted in coordination with the U.S. Fish and Wildlife Service's Idaho Cooperative Fish and Wildlife Research Unit is using "gap analysis" to evaluate and protect biological diversity. GIS are being used to overlay digital layers, including statewide maps at the 1:500,000 scale for vegetation, terrestrial vertebrate species, localities of threatened and endangered species, ecoregions, existing reserves and land ownership. The goal is to identify unprotected species and unprotected areas in each ecoregion that contain high species richness or vegetation types that may be threatened by future changes in land use. Alternative future development patterns are being analyzed using GIS. Idaho was the first state to have "gap analysis" work conducted, including the development of appropriate procedures. Currently, programs are also in place in Oregon, Utah and California and are being considered throughout the states. The Nature Conservancy is using gap analysis to determine which lands should be acquired in their land purchasing program, and the National Wildlife Federation is also participating in gap analysis efforts. A workshop entitled "Gap Analysis: Protecting Biodiversity using GIS," was held at the University of Idaho in October, 1990.

The **Department of Health and Welfare's Division of Environmental Quality (DEQ)** has been working with the Idaho Department of Water Resources (IDWR) on a Groundwater Vulnerability Assessment Study since 1989. The study is being developed in cooperation with the U.S. Environmental Protection Agency, the U.S. Soil Conservation Service, the U.S. Geological Survey, and IDWR. The project is statewide, and uses GIS to rate areas for susceptibility to groundwater pollution. In another application, soil corrosivity is being analyzed to set priorities for removal and replacement of underground storage tanks. DEQ has installed pcARC/INFO on a PS2 model 80.

The **Department of Lands** plans to use GIS to analyze land and resource management alternatives and other activities on the 2.5 million acres of state owned endowment lands. It is using ARC/INFO on a SUN workstation. It maintains a cellular GIS Land Information and Management

System that will be replaced using ARC/INFO. This system primarily includes forest resource information.

The **State Tax Commission** is working with IDWR to use GIS, for economic development. In this pilot project all private forest land in the state will be assessed for its timber-growing potential, using GIS modelling. The Commission is using ARC/INFO on a Hewlett Packard 9000 work station.

The **Department of Education** contracted with IDWR to produce digital school district boundaries.

The Nature Conservancy is using gap analysis to determine which lands should be acquired in their land purchasing program, and the National Wildlife Federation is also participating in gap analysis efforts.

The **Idaho Transportation Department** (ITD) is building digital data for highway management and planning, and has a cost sharing project with the U.S. Geological Survey for the production of digital 1:24,000 scale quadrangles. It is also sharing digital data about boundaries with the State Tax Commission, and Ada County and Boise on highway mapping. ITD is working on a GPS project in a joint effort with other states and the U.S. Federal Highway Administration. Idaho is a pilot location in the project for testing GPS to create digital coverages for road networks (see Ohio profile).

Academic Activities

The **University of Idaho** has five departments with GIS facilities and is actively involved in statewide GIS activities. Activities are underway in the Departments of Geography, Landscape Architecture and Forestry, as well as the Fish and Wildlife Research Group. Regular classes and training sessions are held for public and private entities. The Department of Geography is conducting a pilot project for forest management in the Clearwater National Forest.

This legislation created the Ground Water Quality Council, provided for completion of the Ground Water Quality Plan, and designated the Department of Health and Welfare as the primary agency to coordinate and administer ground water quality protection programs for the state. It recognized that "the Department of Water Resources has the responsibility to maintain the natural resource GIS for the state and is the collector of baseline data for the state's water resources." The act directed the two departments and also the Department of Agriculture to develop and maintain a "comprehensive water resource data system" and a "ground water quality monitoring network" as well as a natural resources GIS. It provided that the systems be available to the public. All state agencies and local governments were directed to "incorporate the adopted ground water quality protection plan in their programs."

Executive Order 88-16, Renaming the Idaho Mapping Advisory Committee to the Idaho Geographic Information Advisory Committee (IGIAC), June 22, 1988.

The Executive Order states that "it is in the interest of the State of Idaho, federal resource management agencies, local government and private organizations to professionally respond to the growing resources management problems in the state, and . . . various geographic information activities—such as remote sensing, digital cartography, and GIS—are basic to sound resource management; therefore, it is necessary to minimize duplication and maximize utilization of state and federal funds expended on these activities." It charters the Idaho Geographic Information Advisory Committee (IGIAC) to review new geographic information mapping and remote sensing technology applications, make recommendations to state and federal agencies, and assist in the preparation of requests to pertinent federal agencies. Voting members are state agencies, including the Departments of Lands, Transportation, Water Resources, Financial Management, Fish and Game, and Parks and Recreation (with Health and Welfare, and the State Tax Commission added later that year). Ex-officio members include federal agencies operating in the state, industry associations, and key academic institutions in the state with GI expertise. An annual meeting and report is required in the order.

Executive Order 88-3, Continuation of an Idaho Image Analysis Facility (IIAF) at the Idaho Department of Water Resources (IDWR), May 27, 1988.

The Executive Order replaced previous orders adopted in 1984 and 1986 and reaffirmed that Idaho Department of Water Resources (IDWR) is the

4 Documents List

Directives

Idaho Code 39-102, Ground Water Protection Act, 1989.

state agency responsible for the Idaho Image Analysis Facility (IIAF). It stated the IDWR will provide coordination and technical support; promote operational applications of digital image analysis and GIS; provide technical assistance in the form of consultation and training; cooperate with, receive and expend funds from other sources; and assess needed capabilities and cooperate with Idaho universities and other research institutions.

Publications

Policy Statement for GIS, Idaho State Mapping Advisory Committee, (later named Idaho Geographic Information Advisory Committee), April, 1988.

This policy statement was adopted by the Idaho Mapping Advisory Committee (IMAC) and approved by the director of each member agency in April, 1988. It was also affirmed by the Governor in his June 22, 1988 letter to agency directors. It discusses the importance of coordination and includes objectives, policies, and management and organizational responsibilities. It states that well planned implementation strategies are needed, including data standards. It states IGIAC is responsible for developing data standards for GIS and the development of specifications for the contract purchasing of GIS hardware and software in conjunction with the state purchasing agent and the state data processing coordinator and in accordance with each agency's approved automated data processing plan. The statement established the GIS Subcommittee, and directed it to have quarterly meetings for information exchange, work status review, identify opportunities for exchange of data, joint production of data or the contracting of work between state agencies, and review needs for geographic information and determine data categories necessary for statewide applications. It is also responsible for establishing and maintaining an inventory of each category's collection status. A central catalog of geographic information for current and future agency and statewide applications is suggested.

Recommended Standards for Digital Cartographic Data, Idaho State Mapping Advisory Committee, (later named Idaho Geographic Information Advisory Committee), January 29, 1988.

These standards were adopted by the Idaho State Mapping Advisory Committee, on January 29, 1988, approved by the Information Management Policy Board and the Information Management Council, and affirmed by the Governor in his June 22, 1988 letter to agency directors. The standards provide for the following:

1. Geographic Base Data These data elements are statewide and "must be at a level of accuracy suitable for interchange with federal and local en-

tities." The U.S. Geological Survey's Digital Line Graph (DLG) is the recommended standard. It states "any data which are digitized from a 7.5 quadrangle map should conform to this DLG standard."

2. Idaho GIS Data These data are "system" specific, and the document recognizes that vendors represent data in different ways. It states that when the state establishes a recommended GIS standard, "this category of data can be captured and remain in the standard system format."

3. Project Specific Data For data collected to meet the needs of a single agency and not intended for interchange "no standard is appropriate."

Regional Survey of Energy/Environmental Databases, Idaho Department of Water Resources, January, 1990.

This document was developed from a one page questionnaire sent to state, federal and local agencies, as well as some private companies. It was conducted by Idaho Department of Water Resources in January, 1990 under contract and with funding from the Bonneville Power Administration. Information is provided for over 80 tabular databases, including title, agency, contact name and phone, description, status, coverage, update frequency, availability, source, date collected, and data format. Most of the data holdings included are those of the Idaho Department of Water Resources.

Idaho Geographic Information Advisory Committee - 1989 Annual Report, Geographic Information Advisory Committee, January, 1990.

This 1989 annual report is one of many prepared by the Idaho Geographic Information Advisory Committee and its predecessor, the Idaho Mapping Advisory Committee. It includes policies and standards adopted in 1988 and a report of the state's Geoprocessing Conference held in March 1989, where status reports were heard on mapping, orthophoto, aerial photography, digital data and GIS implementation at the federal, state and local level. Status maps for these activities are included in the report. The report also includes many recommendations to federal and state agencies in general and to the U.S. Geological Survey specifically.

Gap Analysis: Protecting Biodiversity using GIS, A Handbook prepared for a workshop held at the University of Idaho, Scott, J. Michael, Hal Anderson, and others, October 29-31, 1990.

This handbook provides guidance and examples from the first project ever conducted to use GIS in "gap analysis" to evaluate and protect biological diversity. GIS are used to overlay digital layers for vegetation, terrestrial vertebrate species, localities of threatened and endangered species, ecoregions, existing reserves and land ownership.

The goal is to identify unprotected species and unprotected areas in each ecoregion that contain high species richness or vegetation types that may be threatened by future changes in land use. Idaho was the first state to have "gap analysis" work conducted, including the development of appropriate procedures. This handbook was designed to be of assistance to others attempting a similar project.

Papers

Idaho's Centennial Poster: Producing a Statewide Digital Mosaic from Landsat, Kramber, W.J., A. Morse, T.J. Zarriello, B.R. Britton, Idaho Department of Water Resources, Proceedings of the ACSM/ASPRS Annual Convention, Denver, Colorado, March 18-23, 1990.

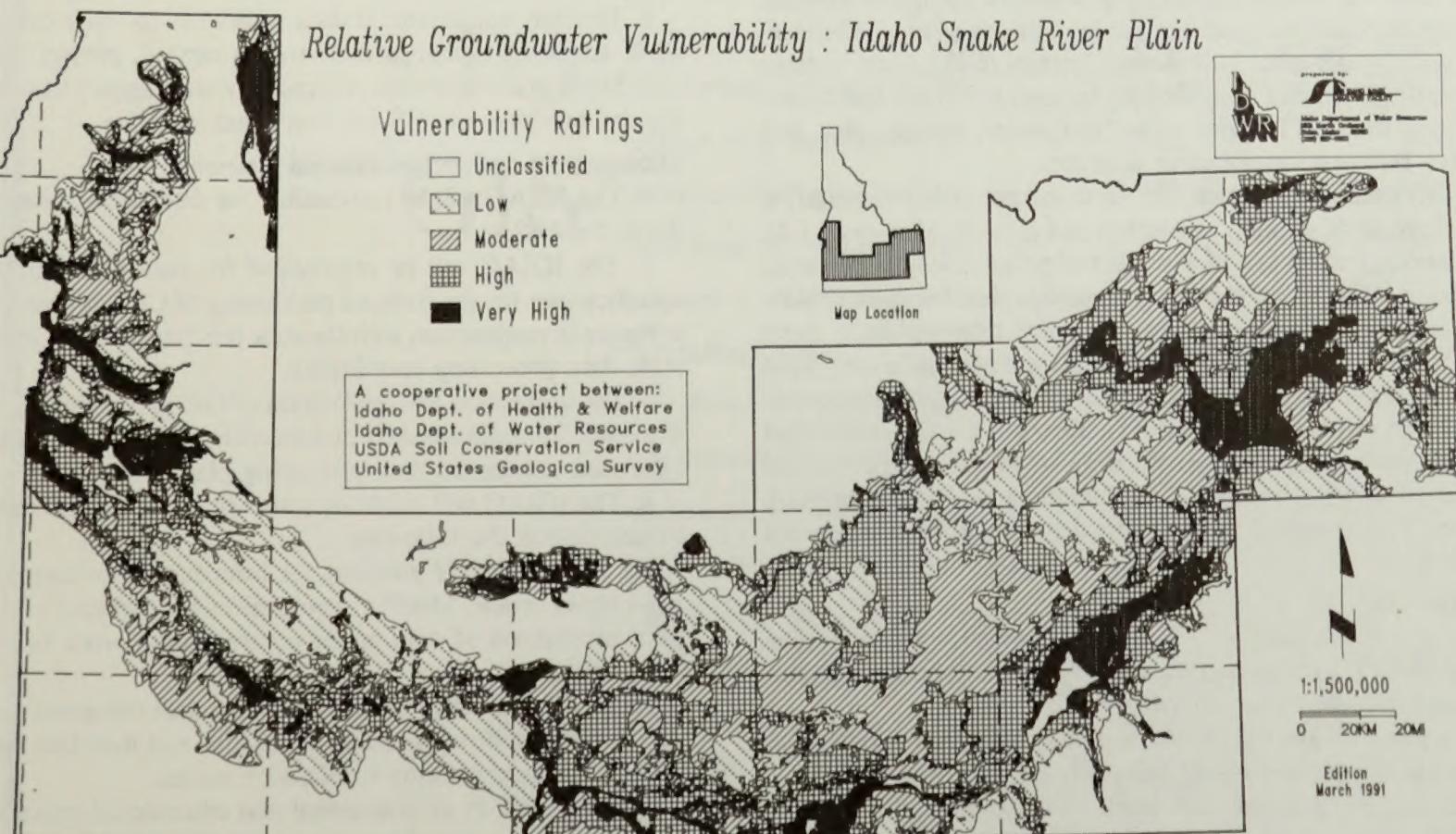
The staff of the Idaho Image Analysis Facility (IIAF), part of the Idaho Department of Water Resources, recently produced a Landsat digital mosaic of Idaho. Images were digitally processed using both ERDAS and in-house software running on an IBM compatible personal computer. Cartographic data were edited on mylar negatives at the final mosaic scale of 1:1,000,000, and composited during offset printing. The production process from data acquisition to delivery of the final product is described.

Estimating Idaho's Irrigated Acreage Using Statistical Sampling, GIS, and Color Aerial Slides, Morse, Anthony, Idaho Department of Water Resources, Proceedings of the ACSM/ASPRS Annual Convention, Denver, Colorado, March 18-23, 1990.

The Idaho Department of Water Resources uses GIS and 35mm color aerial slides with a statistical sampling methodology to estimate the acreage of irrigated agriculture in Idaho. These estimates are produced as part of the USGS Water Use Data program by using five digital data layers including Landsat FCC prints.

Water Resource Applications of GIS in the State of Idaho, Morse, Anthony, Idaho Department of Water Resources, GIS'90 Symposium, Vancouver, British Columbia, March 1990.

The Idaho Department of Water Resources, as the state's lead agency for remote sensing and GIS, has several GIS water resources projects capturing data layers, building data bases, and analyzing data on a statewide basis. Projects include the Comprehensive Rivers Project that will use GIS to enable the state to conduct licensing of hydro-power rights to be delegated by the Federal Energy Regulatory Commission, the Snake River Basin Adjudication project providing PLSS data for 90% of the state, and the Bear River Compact Depletion Study which is using Landsat digital imagery for Idaho, Utah and Wyoming to develop a historic map for monitoring water development in the river basin. Other projects include groundwater vulnerability analysis in cooperation with the state's Department of Health and Welfare and federal agencies, soil corrosivity that is being used to set priorities for removal and replacement of underground storage tanks, groundwater source irrigation and its impact on hot-spring pools to determine strategies for coexistence of potential



endangered species, and development of water statistics on irrigated agriculture to meet contractual needs with the USGS's Water Resources Division. Idaho, Montana, Oregon and Washington are working with the Bonneville Power Administration to use GIS in analyzing alternative sites for energy generation.

Using Remote Sensing and GIS Technology to Help Adjudicate Idaho Water Rights, Morse, Anthony, Thomas J. Zarriello, William J. Kramber, Idaho Department of Water Resources, Photogrammetric Engineering and Remote Sensing, Vol. 56, No. 3, March, 1990.

GIS, image processing and remote sensing are being used to help adjudicate water rights in the Snake River Basin of Idaho, representing almost 90% of the state's land area and the nation's largest water-right adjudication. Information from a variety of sources including satellite digital data, U-2 photography, 35mm aerial slides, 1:100,000

scale clear Mylar maps, cadastral survey plats on microfiche, and 1:24,000 scale orthophoto quads are being used.

Combining Raster, Vector, and Attribute Data to Highlight Spatial Patterns in Idaho Water Rights, Morse, Anthony, Thomas J. Zarriello, and Ben J. Britton, Idaho Department of Water Resources, presented at conference: Image Processing 1989, Reno, Nevada.

The Idaho Department of Water Resources delineates spatial patterns in water rights by combining three types of data into a hybrid image. These data include Landsat images, a digital version of the PLSS and the Idaho master water rights file. Previously hidden patterns of irrigation over time, irrigation without water rights, water rights not put to beneficial use, and spatial patterns of groundwater versus surface are discovered through this method.

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Document Excerpts

STATE OF IDAHO

Policy Statement for GIS

(This policy statement was adopted by the Idaho Mapping Advisory Committee and approved by the director of each member agency in April, 1988. It was also affirmed by the Governor in his June 22, 1988 letter to agency directors.)

Background

In the past decade, governmental agencies and private industry have developed increasingly powerful computer systems designed to process and analyze map information. Collectively called geographic information systems (GIS), these systems have the potential to significantly increase efficiency and reduce costs to the state for conducting land, water, demographic, and other resource management activities.

GIS technology, much like the computer field in general, is in a period of dynamic evolution and growth. Moreover, GIS technology is but one of a number of related technologies (e.g. remote sensing, and digital cartography) that could assist state agencies in carrying out their mandated responsibilities more efficiently. Indeed, these technologies are becoming ever more closely linked, and are part of the information management activities of Idaho. Within this framework, it is imperative that emphasis be placed on coordination between the departmental organizations currently using or planning to use these technologies. This coordination will facilitate exchange of data between agencies.

Objectives

1. Encourage and assist in the development, implementation and use of GIS to meet current and future statewide and departmental missions and objectives.
2. Establish an effective management and support framework for the orderly growth of GIS technology within the state.
3. Achieve and maintain levels of hardware, software, and data compatibility in accordance with state standards and promote the sharing of technology, research, applications, and data resources throughout the State of Idaho.

4. Encourage cooperative work among state agencies, universities, federal agencies and private associations to test, demonstrate, and complete cooperative projects within their mandated responsibilities.

5. Coordinate development of statewide information predicated upon agencies implementing their own GIS.

6. Develop a central catalog of GI for current and future agency and statewide applications.

Policies

It is the policy of the State of Idaho to encourage the utilization of GIS when such use enhances the overall cost effectiveness of administrative functions or improves productivity. It is also the state's policy to acquire and support GIS through well planned implementation strategies. These strategies include:

1. Develop and maintain data standards for base category data, statewide exchange data and as needed, project data.
2. Develop and maintain contracts for state agency use covering the purchase of GIS hardware and software.

Management and Organizational Responsibilities

1. The IGIAC will be responsible for developing data standards for GIS.

2. The IGIAC will be responsible for the development of specifications for the contract purchasing of GIS hardware and software in conjunction with the state purchasing agent and the state data processing coordinator.

3. The acquisition and application of GIS hardware and software will be accomplished in accordance with each agency's approved automated data processing plan.

4. The IGIAC will establish a standing GIS Subcommittee to accomplish the following:

4.1 Hold quarterly meetings for information exchange and work status review. Identify opportunities for exchange of data, joint production of data or the contracting of work between state agencies.

4.2 Review needs for GI and determine data categories necessary for statewide applications. Establish and maintain an inventory of each category's collection status.

4.3 Provide GIS informational and educational opportunities as needed.

4.4 Work with agencies to implement the objectives of this policy.

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